

AN APPARATUS FOR RECORDING THE
OUTPUT AND CORONARY FLOW IN
THE HEART-LUNG PREPARATION

BY R. P. STEPHENSON

From the Department of Pharmacology, University of Oxford

(Received 16 February 1948)

The apparatus recently described (Stephenson, 1948) for recording the outflow from small perfusions has been adapted and used to record the much larger flows which occur with the heart-lung preparation of the dog. The apparatus is shown in Fig. 1. The blood from the heart enters the apparatus through the glass tube (*a*) which reaches to the bottom of the wider tube (*b*). The flow from this tube is restricted by a third tube (*c*), and the amount of blood in (*b*) adjusts itself until the pressure it exerts is sufficient to send as much blood out at (*c*) as is entering at (*a*). Any alteration in the rate of flow produces a corresponding adjustment of the level of fluid in (*b*), and the change in volume is recorded on smoked paper with a piston recorder. The lower end of the tube (*a*) is turned up to ensure that the blood is continually mixed and does not stagnate in the upper part of tube (*b*). The sensitivity of the apparatus can be altered by changing the tube (*c*). The narrower the tube the more sensitive the apparatus.

An example of the use of two such recorders is given in Fig. 2. The upper record is of the outflow from the coronary sinus collected from a Morawitz cannula. The middle record is of the systemic outflow from the brachiocephalic artery. At the beginning of the record the coronary outflow was 44 c.c./min. and the systemic output was 790 c.c./min. When the arterial resistance was lowered from 110 to 90 mm. Hg, the coronary flow fell from 44 to 36 c.c./min. With the reduction in resistance there was a transient rise in the systemic output from 790 to 840 c.c./min. After about 8 min. the arterial resistance was raised to 105 mm. and the coronary flow in consequence rose to 43 c.c./min. With the rise of resistance there was a transient reduction in systemic output to 740 c.c./min.

The continuous records of flow make it possible to demonstrate sudden and transient changes, and to show the dependence of coronary flow on arterial pressure in a simple manner.

The blood leaving the tube (c) can be collected in a measuring cylinder and the record thus calibrated. This should be done repeatedly in the course of each experiment, as the sensitiveness of the recorder depends on the height of the column of blood in (b).

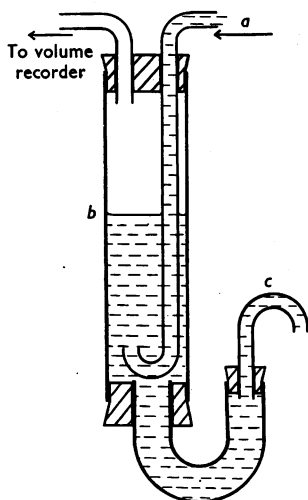


Fig. 1.

Fig. 1. Diagram of outflow recorder (see text).

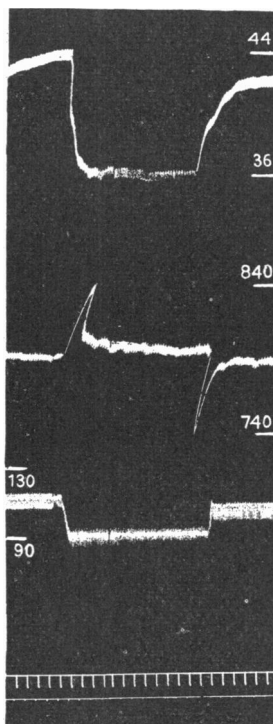


Fig. 2.

Fig. 2. Heart-lung preparation. Upper record, outflow from coronary sinus (c.c./min.). Middle record, systemic outflow (c.c./min.). Lower record, arterial resistance (mm. Hg). Time 30 sec

The dimensions of the recorders used in the experiment shown in Fig. 2 were as follows: for the output of the heart, tube (b) was 2.15 cm. internal diameter, tube (c) was 0.43 cm. internal diameter and about 7 cm. long, and the piston recorder had an internal diameter of 3.2 cm.; for the record of coronary flow the corresponding dimensions were 1.70, 0.22 and about 5 cm., with a piston recorder of 1.8 cm.

I am indebted to Dr Edith Bülbring for providing me with Fig. 2.

REFERENCE

Stephenson, R. P. (1948). *J. Physiol.* **107**, 162.